Questions 10, 11, 15, 81 – 95 odd, 126, 133

10) d. Exactly 120g (law of conservation of mass)

11) d. The properties are not necessarily like either A or B. The product could be completely different from either.

15) The subscripts and coefficients must be whole numbers. Atoms and molecules are whole things, you can't have half an atom, even if it helps balance an equation.

81-87) Check your balanced equations in the back of the book.

89) $\frac{15.0\text{ g Fe}}{} \left| \frac{1\text{ mol Fe}}{55.85\text{g Fe}} \right| \frac{1\text{ mol } Fe_2O_3}{2\text{ mol Fe}} \left| \frac{159.70\text{ g } Fe_2O_3}{1\text{ mol } Fe_2O_3} \right. = \mathbf{21.4\ g\ Fe_2O_3}$

$\frac{15.0\text{ g Fe}}{} \left| \frac{1\text{ mol Fe}}{55.85\text{g Fe}} \right| \frac{2\text{ mol Al}}{2\text{ mol Fe}} \left| \frac{26.98\text{ g Al}}{1\text{ mol Al}} \right. = \mathbf{7.25\ g\ Al}$

$\frac{15.0\text{ g Fe}}{} \left| \frac{1\text{ mol Fe}}{55.85\text{g Fe}} \right| \frac{1\text{ mol } Al_2O_3}{2\text{ mol Fe}} \left| \frac{101.96\text{ g } Al_2O_3}{1\text{ mol } Al_2O_3} \right. = \mathbf{13.7\ g\ Al_2O_3}$

91) $\frac{1{,}000\text{ g Al}}{} \left| \frac{1\text{ mol Al}}{26.98\text{g Al}} \right| \frac{3\text{ mol } NH_4ClO_4}{3\text{ mol Al}} \left| \frac{117.49\text{g } NH_4ClO_4}{1\text{ mol } NH_4ClO_4} \right. = \mathbf{4.355g\ NH_4ClO_4}$

93)

$\frac{1.0 \times 10^7\text{ g wastewater}}{} \left| \frac{3.0\text{g } NH_4^+}{100\text{ g wastewater}} \right| \frac{95\text{ g } NH_4^+\text{ consumed}}{100\text{ g } NH_4^+} = 285{,}000\text{ g } NH_4^+$

$\frac{285{,}000\text{g } NH_4^+}{} \left| \frac{1\text{ mol } NH_4^+}{18.042\text{g } NH_4^+} \right| \frac{1\text{ mol } C_5H_7O_2N}{55\text{ mol } NH_4^+} \left| \frac{113.116\text{g } C_5H_7O_2N}{1\text{ mol } C_5H_7O_2N} \right.$

$= \mathbf{32\ kg\ C_5H_7O_2N}$

95) $\frac{100.\text{g } C_7H_6O_3}{} \left| \frac{1\text{ mol } C_7H_6O_3}{138.118\text{g } C_7H_6O_3} \right| \frac{1\text{ mol } C_4H_6O_3}{1\text{ mol } C_7H_6O_3} \left| \frac{102.088\text{g } C_4H_6O_3}{1\text{ mol } C_4H_6O_3} \right.$

$= \mathbf{73.9g\ C_4H_6O_3}$

126)

$$1.0 \times 10^9 \text{ g } HNO_3 \left| \frac{1 \text{ mol } HNO_3}{63.018 \text{ g } HNO_3} \right| \frac{3 \text{ mol } NO_2}{2 \text{ mol } HNO_3} \left| \frac{2 \text{ mol NO}}{2 \text{ mol } NO_2} \right| \frac{4 \text{ mol } NH_3}{4 \text{ mol NO}} \left| \frac{17.034 \text{ g } NH_3}{1 \text{ mol } NH_3} \right.$$

$$= 4.1 \times 10^8 \text{ g } NH_3$$

$$= \mathbf{4.1 \times 10^5 \text{ kg } NH_3}$$

133) Volume of copper = l x w x h = 8.0cm x 16.0cm x 0.060cm = 7.68 $cm^3$

$$10{,}000 \text{ boards} \left| \frac{7.68 \text{ cm}^3 \text{ Cu}}{1 \text{ board}} \right| \frac{8.96 \text{ g Cu}}{1 \text{ cm}^3 \text{ Cu}} \left| \frac{80. \text{ g Cu removed}}{100 \text{ g Cu}} \right. = 550{,}500 \text{ g Cu removed}$$

$$550{,}500 \text{ g Cu} \left| \frac{1 \text{ mol Cu}}{63.55 \text{ g Cu}} \right| \frac{1 \text{ mol } Cu(NH_3)_4Cl_2}{1 \text{ mol Cu}} \left| \frac{202.586 \text{g } Cu(NH_3)_4Cl_2}{1 \text{ mol } Cu(NH_3)_4Cl_2} \right.$$

$$= \mathbf{1.8 \times 10^6 \text{ g } Cu(NH_3)_4Cl_2}$$

$$550{,}500 \text{ g Cu} \left| \frac{1 \text{ mol Cu}}{63.55 \text{ g Cu}} \right| \frac{4 \text{ mol } NH_3}{1 \text{ mol Cu}} \left| \frac{17.034 \text{g } NH_3}{1 \text{ mol } NH_3} \right. = \mathbf{5.9 \times 10^5 \text{ g } NH_3}$$